

XVI. On *Zizeeria* (Chapman), *Zizera* (Moore), a group of Lycaenid Butterflies. By T. A. CHAPMAN, M.D.

[Read March 2nd. 1910.]

PLATES LI—LX.

MOORE instituted the genus *Zizera* for a group of butterflies, of which he placed three, that occur in Ceylon, viz. *karsandra*, *indica* and *gaika*, in it. His diagnosis of the genus accords with *karsandra* (*lysimon*) as the type.* He appends to the diagnosis, however, the words "Type, *Z. alsus*." *Alsus*, however, belongs to a totally different group of "blues," and does not conform to Moore's diagnosis of *Zizera*. One can only suppose that Moore, without really examining *alsus*, thought to make his work more acceptable to British readers by placing a British species as type. To appeal to an unintelligent public in this way is clearly to be regretted in a matter of science, whatever it may be in other fields of human activity.

The question arises, Does *Zizera* belong as a generic name to *alsus* or to *karsandra*?

It may be noted that both de Nicéville and Bingham, in dealing with the genus, cite *alsus* as the type; and Butler, in his very useful list of the species (Proc. Zool. Soc., 1900, p. 104), includes *alsus*, and adds the *alter ego* of *alsus*, *lorquinii*. The rule apparently governing the point is clearly expressed thus: "When, in the original publication of a genus, one of the species is definitely designated as type, this species shall be accepted as type regardless of any other consideration."

At first view this seems to make *alsus* unquestionably the type. But one may view the matter thus: *alsus* is not a species of the genus, and so cannot by any one (even Moore) be made the type. It is further clear that Moore made the genus for and on *karsandra*, and having done that, the law of priority, valid now and here for him, if for no one else before publication, it was impossible to assert anything outside it as type. The case is certainly a puzzling and unusual one. Another consideration also

* "Lepidoptera of Ceylon," vol. i, p. 78, 1880.

arises. *ZIZERA* has been used for the *karsandra* group over and over again, but, I think, never for *alsus*, till we come to Butler's list (1900). Short as twenty years may be, it is perhaps sufficiently long, in this unusual case, to add weight to the view that *karsandra* is the type, on the recently strongly advanced contention that use and wont shall be duly considered in this question.

If all this, however, is mere prejudiced special pleading, and this view is finally held to be erroneous and that *karsandra* (with its allies) has to be provided with a new genus, I would suggest that the new name be *Zizceria*, as making the change least troublesome.

Possibly my best course is to replace *Zizera* by *Zizceria* (for *karsandra*), it will make matters clearer, and only add another synonym if my alternative contention holds good. To do this is, of course, rather to sit on the fence. If *Zizera* adheres to *alsus* (*minimus*) I fancy it becomes a synonym, but that is a matter that does not now concern me. For details of *C. minimus* I may refer to Tutt's "British Lepidoptera," vol. x (Butts., vol. iii).

My interest in the *Zizcerias* originated in the resemblance of one or two species in some of their forms to *Lycaenopsis*, and in the question whether the genus is a genus of *Lycaenopsids*. I am now quite satisfied that *Zizceria* and *Lycaenopsis* belong to quite separate groups. I have no very clear ideas as to the limits and contents of the group to which *Zizceria* belongs, nor as to what its name ought to be. As it has not yet got one, we may for convenience call this section of it the *Zizceriidi*; we may define the whole group as containing those species with the dorsal armature in two moderately separated portions, *i. e.* with a narrow and (comparatively) structureless medio-dorsal portion, and each lateral portion carrying a more or less long curved hook articulated to it. In *Zizceria* this hook is remarkably long and slender. In the structure of the girdle or ring there are one or two interesting points. One of these is the central dorsal portion which I have described as narrow; this consists of two portions, the anterior and posterior; in most of the species these are fairly close together, and look like what, no doubt, they are, the anterior and posterior margins of the dorsal bridge more fully chitinised, as margins often are; but in *ossa*, less in *maha*, but very markedly in *lysimon*, these two portions are separate. So that in

lysimon there appears to be the usual narrow dorsal bridge, but further back is another transverse strip, that is at first glance very puzzling, as the membrane that attached it to the other portion is lost in maceration. This lower bridge is seen in figs. 18, 19 and 20. Another item is a distal, weakly-chitinised, finger-like process, best seen in *ossa*, but also very evident in other species; see fig. 13, *maha*. It is also very plain in *indica* (fig. 29). I have also noted (under *ossa*) another projection (see fig. 19).

It is noteworthy that both these processes occur (somewhat modified) in *Antizera*, especially *atrigenmata* and *lucida*. The Indian *Zizeerias* were those in which I first was interested, and a critical examination of these affords a solution of nearly all difficulties.

De Nicéville ("Butterflies of India," 1890) gave thirteen species, but stated definitely his opinion that there were really only four species. Bingham ("Fauna of British India," 1907) adopted this view and gives only four species.

The fact is that there are six species of *Zizeeria* (*sensu lato*) in British India. In Butler's inclusive list of the species in the Proc. Zool. Soc. (1900) these six species appear under nine names, or eleven if we include names applied to the same species in other regions.

The six Indian species are *maha*, *ossa*, *karsandra*, *gaika*, *otis* and *sangra*. The two last names represent two distinct species, one of which, *sangra*, is a form of *labradus*; if the name *otis* belongs really to the same species, then the other species is *indica* (Murray).

In Butler's list, *antanossa* is a distinct (African) species allied to *otis* (*indica*), and *atrigenmata* probably belongs to the Zizeeriid group, but to a genus very distinct from *Zizera*.

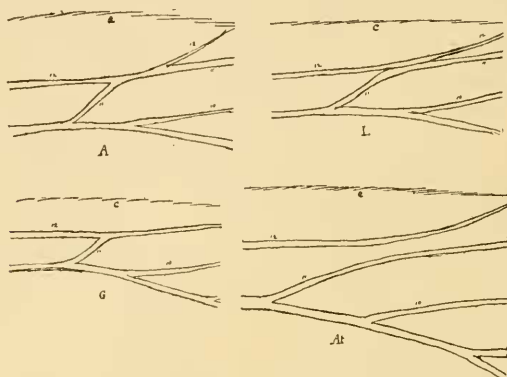
Gaika is certainly related to the *Zizeeriidi*, but its neuuration and the dorsal armature of the appendages make its exact position very doubtful. It certainly does not belong to the genus *Zizeeria* (type *karsandra*).

We have then six (or seven if we make *lysimon* and *karsandra* distinct) species of true Zizeeriids, *i.e.* that conform to my definition of them as possessing very long slender curved and sharp-pointed hooks (or articulated spines) to the dorsal armature of the male appendages (making with *gaika* seven (or eight)).

When we consider the structure of the male clasps,

these seven species divide themselves into two groups, viz. 1st, *maha*, *ossa* and *lysimon* with *karsandra*, and 2nd, *labradus*, *indica*, and *antanossa*.

If we regard the neuration, they again divide into two groups, *gaiika* forms one and all the other species the other.



Rough camera sketches of the relations to each other of veins 11 and 12 of forewing, in A, *Alsus (minimus)*, L, *lysimon*, G, *Gaiika*, At., *atrigemmata*,³ c = costa, veins as numbered—enlargement $\times 16$.

The *atrigemmata** group differs much in the appendages, especially the dorsal hooks are shorter and have rounded and blunt points. The neuration is also different from the true *Zizeeriids*.

We find, then, that we have in the *ZIZEERIIDI* (*Zizera*, Moore) (type *karsandra*) 7 species—*maha*, *ossa*, *lysimon*, *karsandra*, *labradus*, *antanossa*, *indica*. These species fall into two divisions, which ought properly perhaps to be distinct genera, but may be called divisions or sub-genera if any one so prefers.

1. *ZIZEERIA* (restricted). Moore's definition of *Zizera*, but with these additions: a spot in cell underside forewing, beneath hindwing the first three spots (from costa) are in line; clasps with broad extremity and bold teeth, and soldered to each other for some distance basally. Type *karsandra* (with *lysimon*, *maha* and *ossa*).

2. *ZIZINA*, n. g.—Moore's definition of *Zizera*, with the addition of there being no spot in cell beneath forewing, the spot beneath hindwing in space between veins 6 and

* Placed in *Zizera* by Butler, *l. c.*

7, advanced basally so as to be quite out of line with those above and below it. Clasps only slightly soldered together and with minute terminal teeth, but with a solitary hair * longer than the clasp, thick and clubbed, arising close to its base. Type, *labradus* (with *indica* and *antanossa*).

3. ZIZULA, n. g.—*Gaika* does not conform in neuration to *Zizera*, and requires a separate generic heading, vein 11 of forewing joining vein 12, and not again separating, i. e. it forms merely a bar from cell to vein 12. Like *Zizeeria* (restricted), the hindwing spots are in a continuous row, but like *Zizina*, it has no spots in cell of forewing. The appendages possess a long clubbed hair just as in *Zizina*, so that one doubts whether the neuration has the importance that custom compels one to attach to it.

The wings are rather more elongated than in *Zizeeria* and the spots beneath fall into a long oval on each wing, rather than into the usual "blue" pattern as in *Zizeeria*.

I suggest

ACTIZERA (Aktin † Zizera)

as a generic name for *atrigemmata*, with which *lucida*, *stellata* and *panagaea* appear to be congeneric.

Veins 11 and 12 of forewing approach one another as in Plebeiid blues, but are far from touching each other.

The appendages are similar to those of *Zizeeriidi* as to the dorsa except for the comparative shortness of the hooks, which terminate with a rounded end with very little tapering. The clasps are bent, of quite a different pattern to those of *Zizeeriidi* proper, and have teeth (when present) not terminally, but along the inner lower margin. The facies, at least of *atrigemmata*, is very Zizeeriid, and on its superficial characters one might suspect it to be a geographical race of *lysimon*.

When we come to the individual species my interest has largely been in the Indian forms, of which de Nicéville describes thirteen species, but states very distinctly his opinion that there are only four.

* This hair may be regarded as homologous with the lowest of a continuous row that exists on the clasp of *lysimon*, or more probably with a still lower one of the same series, absent in *lysimon*.

† In reference to the white ray beneath the hindwing, present in *atrigemmata*, usually very marked in *lucida*.

In examining the genitalia of this group, as a possible outlier of the *Lycænopsids* I found that there were certainly more than four Indian species. Accordingly I felt it desirable to examine the whole group as far as possible.

The Indian species are really six, which I will call provisionally *maha*, *ossa*, *karsandra*, *indica* (Murray = *otis*?), *sangra* (Moore = *labradus*) and *gaika*.

I further concluded that the central group of true *Zizeeriids* contained only these six, with the possible exceptions of *antanossa*, which may be held to be distinct, but which may perhaps be as easily regarded as a geographical race of *indica*, and *lysimon*, which I incline to accept as distinct from *karsandra*.

ZIZEERIA.—1. *Karsandra* is usually smaller than *maha* or *ossa*, but is sometimes 24 mm. in expanse, whilst *ossa* is often only 22, and *maha* is sometimes as small; indeed, I have one specimen of only 20 mm.

Beneath the fore-wing the post-discal row of spots is bolder than in *maha*, and instead of being in a slightly curved line is much arched, bringing the spot between veins 2 and 3 much nearer the angle of the cell. Some specimens of *maha* and *ossa*, however, vary in this direction. A more constant difference is that *karsandra* has a spot between veins 9 and 10, which much increases the curved appearance of the row of spots. I am not sure that this spot is ever absent in *karsandra* or *lysimon*; in *maha* it is present as a not very rare aberration.

I have a specimen from the Moore collection labelled *sangra* (Mergui), and placed in it with real *sangra*, that apparently was taken in the same locality as and with *sangra*, and that differs from the type by having no spot in the cell beneath the forewing, and in the row of spots being rather small and more equal as in *sangra*, and not large and bold and of graduated size. It can nevertheless be recognised as *karsandra* by the position of the second spot in the row beneath the hindwing. For myself, I must confess I had examined the appendages before noting these several details.

The appendages are shown in figs. 20 and 24.

Fig. 20 shows how the clasps resent the attempt to flatten them by lateral pressure, thereby agreeing with *maha* and *ossa* (figs. 18 and 19).

The Mergui specimen noted above is clearly an aberration of *karsandra*, as wanting sundry spots, and though

the spots in the row are small like *lysimon*, they are graduated as in *karsandra*, and the appendages are those of *karsandra*. Fig. 4 is abnormal as showing a spot beneath that in the cell.

Figs. 20 and 24 (*karsandra*), show how closely the clasp is related in form to those of *maha* and *ossa*.

2. *Lysimon*.—I incline to agree with Butler in treating *lysimon* and *karsandra* as distinct species; at any rate, it is the most convenient way of dealing with them, though I am not disposed to quarrel with any one who asserts them to be only sub-species or marked geographical races of a single species, as it would be a quarrel rather about words than fact.

The points of difference between *lysimon* (fig. 1) and *karsandra* (fig. 4) are: 1st, Underside spotting, the pattern is nearly identical, but the spots of upper wing are small, of equal size, and in a slightly curved row in *lysimon*, large, of varying size and in a much bent row in *karsandra*. This crisp statement may somewhat exaggerate the difference, but it serves, in my experience, to separate the two forms, with few exceptions. 2nd, The appendages differ in the two forms; *lysimon* has the form shown in figs. 22 and 23. Figs. 22 and 23 are practically of the same form, the attitude of the clasp being rather different in the two specimens. This I take to be the usual form of the appendages in the species. Fig. 23 is from a specimen from Teneriffe, and does perhaps differ a little from the more typical form shown in fig. 22 in the greater width just below the crown of teeth, and by the less prominence of the terminal teeth. Figs. 20 and 24 show the form in *karsandra*. Here the terminal teeth project more markedly by a narrowing of the neck below and by a depression in the middle of the toothed margin, so that what one may call the heel is more prominent than is the toe, as in fig. 22. 3rd, The third point is the geographical distribution; *lysimon* is African (with a small subsidiary European range); *karsandra* is Asiatic.

It is of some importance to note that there seems to be no intermediate, no gradation of one form with the other. Yet in the Red Sea region they apparently meet. I have *lysimon* from Aden and *karsandra* from Egypt and South France. The latter (from Lang collection) is doubtless erroneous. Whether those from Egypt are so or not I cannot say.

Knysna is a synonym of *lysimon*; at least, I have examined no *knysna* that are other than *lysimon*. A large specimen is illustrated (fig. 13).

Maha.—*Chandala*, *diluta*, *squalida*, *opalina*, *marginata*, *alboceruleus*, *argia*, *japonica*, *alope*. I enter all these as synonyms of *maha*, as I do not profess to be able to discriminate whether any of them really belong to *ossa*, and possibly hold priority over that name. I take *opalina*, Poujade, by description to be a form of *maha*, and it is very unlikely to be anything else, but as I have not seen a specimen, I cannot assert that it certainly is *maha*. Specimens labelled *opalina* in B. M. are from China, and are *maha*, *opalina*, Poujade, is from Thibet. Butler places *marginata*, Poujade, and *alboceruleus*, Röber, as synonyms of *opalina*. By Poujade's description *marginata* is either *sangra* or *indica*, probably the former. *Alboceruleus* (from Hong Kong), according to Röber's figure, is a form of *maha*. It is not a Thibetan form, and is probably a variety of *argia* (= *maha*), the only species mentioned by Kershaw ("Butterflies of Hong Kong") to which it can possibly be referred.

In Kershaw's "Butterflies of Hong Kong," Plate VIII, fig. 26, called *Zizera maha*, is Moore's *sangra*, a form of *Z. labradus*; and Plate IX, fig. 8, called *Z. argia*, is *Z. maha*, of which *argia* is a local form, rather than perhaps simply a synonym. In the *maha* group, de Nicéville (1890) describes five species, but says he does so merely for convenience, and that he is satisfied that there is really only one species.

Butler (1900), gives four species that he places before *lysimon*, and we may assume that these belong to the *maha* group. These four species afford ten names and synonyms. I have little doubt they belong to the same five species that de Nicéville gives.

Bingham (1907), gives only *maha*, and adds various other names as synonyms.

An examination of the genitalia shows that we have in this group two species, one of which is of course *maha*. The other I shall call *ossa*, without expressing any definite opinion that it may not be entitled to be called *diluta*, or some other of the list of names quoted above. None of the descriptions of any of the synonyms attributable (more or less) to *maha* are definite enough to enable me to say that they refer to *ossa* and not to *maha*. *Diluta* comes the

nearest. I select *ossa*, because it is Swinhoe's name, and he more confidently than any one else persists in saying there are two species (and only two) in this group, though his description of *ossa* is not more distinctive than are those attributed to other names. I have specimens of *chandala*, apparently so labelled by Moore, that have very much the look of *ossa*, but are really *maha*. Possibly Moore meant the name *chandala* to apply to *ossa*, and was deceived by these specimens of *maha* into thinking them identical.

A critical examination (*i. e.* of the genitalia) of the type specimens to which all these names apply is the only way of settling whether *ossa* is or is not a synonym of one of them. Certainly such names as *diluta* and *squalida* appear to point to one of the most common distinctions that enable *ossa* to be (with some probability) recognised as differing from *maha*.

The genitalia afford an unmistakable distinction between these two forms, and each is quite constant in the considerable number of specimens I have examined. But the superficial characters are much less to be depended on.

Some seasonal forms of *maha* are I fancy all but indistinguishable from *ossa*, on the upper surface. The difference where it exists is that *maha* always has at least some blue of the same character as we (in England) regard as belonging to "Blues" (such as *icarus*, *thetis*, *aegon*, etc.). This may be slight and evanescent, the specimen may look quite like *ossa*, until held at some angle that enables the trace of blue to come into view. *Ossa* is without this, and is of a bony whiteness tinted with a grey or green tone, that does not vary with the incidence of light, or at least never yields a definite blue.

Maha averages larger than *ossa*, and in size as in other characters appears to be more variable; *maha* (in my series) varies from 20 mm. to 32 mm., *ossa* from 22 to 28 mm.

The seasonal and geographical variation of *maha* is very great, that of *ossa* apparently much less.

On the underside the markings are of the same pattern in both species, and vary in much the same way. All the spots may be markedly black on a pale, even, almost white ground, or may be pale, almost identical in tint with a pale sienna brown ground-colour, to be made out by the slightly paler rings surrounding them.

This tendency to obsolescence of the spots is rare in the forewing, common in the hind, and apparently more frequent in *ossa*.

The row of spots in the disc of the forewing may be in a fairly regular curve, or by a variation common in many blues with this row of spots, the row may be angled by the spot above vein 2, approximating to the discal spot. The former is the rule in *maha* (fig. 2), the latter in *ossa* (fig. 3), but the exceptions are frequent. On the hindwing the condition is reversed. The same spot approximates the base most in *maha*, in *ossa* it is often quite in line with those on either side, making a nearly straight row of five spots. But again there are many exceptions, so that one cannot confidently separate the species by these characters. I have no doubt that any one who is familiar with both species in the field, could separate them easily, and in the cabinet, I entertain any doubt only over perhaps 10 per cent.

The male appendages are of very similar structure. A reference to photographs of them (*maha*, figs. 17, 18, *ossa*, figs. 19, 21) will save any long description, but it may be pointed out that the clasps are much longer and more slender in *maha*—length 1.05 mm. in *maha*, 0.84 in *ossa*, but the width is equal at the point where the two clasps become free from each other. This point is, however, a two-fifth of the clasp from its base in *ossa*, and less than a third in *maha*. The result is that the clasp of *ossa* looks short and squat beside that of *maha*. The end or head of the clasp is also different. Regarding it, as its outline suggests, as a foot with a heel and toe, the heel in *maha* is square, in *ossa* produced backwards, and tending to have an acute point. The toe consists in *maha* of two spines, very separate and distinct, and usually of about equal length; in *ossa* there is only one spine, terminating in a conical process, on the upper margin of which a notch marks what is probably the homologue of the other spine as developed in *maha*. The process is, however, proportionally larger than in *maha*. The sole of the foot is flat in *maha*, but in *ossa* has a hollow, due to the projecting heel.

ZIZINA.—In the sub-genus or genus we have two Indian species (*sangra* and *indica*) and one African (*antanossa*).

I say *sangra* and *indica*, because these names, though possibly both merely synonyms, have each a definite sig-

nification, which their real names, if I knew them, have not.

Sangra is certainly a form of *labradus*, but then *labradus* is a name up to the present understood to signify the quite Southern Polynesian and Australian forms, and its occurrence in Java, Sumatra, and India has not been recognised.

Then the name *otis* has been applied to a supposed species consisting of both *sangra* and *indica*. My real difficulty in regard to names is in fact that I have no idea what *otis* is. If *otis* = *sangra*, then the two Indian forms are *labradus* and *indica*, but if *otis* = *indica*, then the real names are *labradus* and *otis*. I don't know that this difficulty can be solved without reference to the type specimen of *otis*, if it exist.

I am, no doubt, to blame for not following this point up, since it is not a valid excuse that I interest myself more in the facts than the names; it is, however, an explanation.

I shall call the species (1) *labradus*, with its vars. *sangra* and *dryina*; and (2) *indica*, the latter purely for convenience and clearness until the real value of *otis* as a name is decided.

If we may attach any value to Bingham's remark that *sangra* and *decreta* are slight varieties of *otis*, but that *indica* may be separated by the larger size of the spots, we must conclude that *otis* = *labradus* and *indica* stands good as the name of the other species. The Fabrician description also rather favours *sangra* than *indica*, and the habitat China seems to exclude *indica*, which happens to be very descriptively named, hardly occurring out of India.

De Nicéville and Bingham recognised only one species, and this they agreed must be *otis*, of which therefore *sangra* and *indica* were both synonyms. Butler referred *sangra* to *otis*, retaining *indica* as a separate species. In making two species Butler was here unquestionably right.

In working the matter out, I found that Moore's *sangra* was rarer in India than *indica*, and was represented in his collection by only a few specimens; I concluded, therefore, that *otis* was the common (Indian) species *indica*.

This is contrary to Butler's conclusion, and I fancy to the belief of others, if those can be said to have a belief who recognise *otis* only. Mr. Butler's distinction between

otis and *indica* is precisely that which I draw between *sangra* and *indica*. The B. M. material which he so distributes, is, as judged by its labelling and localities, simply *otis* = *sangra*—*indica* distinct; since *sangra* is a form of *labradus*, the distinction between these two forms that Mr. Butler draws, confirms my view that *otis* is a synonym of *labradus*. The same conclusion is led to by the evidence given by Kershaw (which I refer to under *maha*) as to the species found at Hong Kong.

Taking *labradus* as the first species, we have to enlarge our conception of that insect by adding most of the forms known usually as *otis*, as *sangra*, and also my recently described *dryina*. Its range must also be extended northward to the Himalayas, and to Hong Kong (Kershaw) (again a suggestion that it is *otis*), and in fact to include the habitats recorded for *otis*.

The Indian (or *sangra* form) seems to be rare continentally. I have a specimen labelled by Moore "N. Ind.," and one from Burmah. My other specimens are from Ungu, Mergui (Moore Coll.), Andamans, Nicobars, Key Islands, Celebes, and in the form *dryina* from Java and Sumatra.

Indica, on the other hand, has a comparatively very restricted habitat, India, south and west, including Ceylon, north-east as far as Lucknow. *Labradus* has an immense range of variation geographical, seasonal, and aberrational.

The size varies from (*labradus*) 32 mm., (*dryina*) 34 mm., down to 20 or even less in the *sangra* forms. The spots beneath, especially beneath the hindwing, vary, as in *maha*, from very distinct black spots in white circles, to mere ghosts in which the spots and circles are almost of the ground-colour. How far this variation is seasonal only, I don't know.

Sangra may be distinguished from *indica* by the comparative straightness of the row of spots under the forewings and their smaller and more uniform size, and by the position of the second spot (from the costa) in the row beneath the hindwing. In *labradus* (*sangra*) it is placed so that the line it forms with the first spot would pass close to the discal line and, if continued, would strike the sixth spot. In *indica* it is less basal, so that a similar line would strike the fourth spot. Both these points are well brought out in figs. 5 (*sangra*) and 6 (*indica*).

The form *dryina* (Proc. Ent. Soc., 1908, p. lxxxii) is very large, superficially very like *Lycaenopsis argiolus*

var. *sikkima*. Mr. Druce has a specimen from Java, whence also Col. Swinhoe has specimens somewhat smaller; I have also one from Sumatra. This specimen was in Moore's series of *Z. maha*, which it much resembles, but is very pale, almost white beneath. When I described *dryina* as a new species, I had not worked out the Zizeeriids, and supposed so large a form that was not *maha* must be new (as indeed it was, but not as a species); it did not occur to me that *otis* (i. e. *sangra*) could be so large, or *labradus* occur so far north. The male appendages prove clearly, however, that it is merely a local form of *labradus*. Having figured these it could not remain as a puzzle to any one else, had I failed to trace, as I now do, its real position myself.

The appendages of *labradus* will be better understood by a reference to figs. 25, 26, 27, 28 and 34, and to Plate B, fig. 2 in Proceedings for 1908, than by long description. The figures (when reproduced) will probably fail to show the minute teeth at the end of the clasp; on the end of the clasp to the right of fig. 26 nine minute teeth can be counted on the distal margin.

These figures, with those of *indica* and *garika*, show that the clasps of these are nearly as well seen on lateral compression of the appendages, as when trouble (with risk of damage) is taken to display them by antero-posterior compression after dividing the ring of the appendages. This contrasts with the facts concerning *Zizceria* (*maha*, etc.).

Indica.—As my account of *sangra* had to be somewhat comparative with *indica* I have already really dealt with *indica*. It very closely resembles *karsandra* beneath, differing by the want of the cellular spot on the forewing, and the position of the second on the hindwing.

One may remark here on the curious way in which these species run in pairs.

Indica differs from *sangra* in the spotting, much as *ossa* differs from *maha*, and as again *karsandra* differs from *lysimon*. One can hardly help theorising that *lysimon* is dividing, unless one admits that it has already done so, into these two species on precisely the same lines as the other two pairs have already done.

The clasps in *indica* are not unlike those of *labradus*, but the larger process being comparatively short and simple in structure gives it at first glance an aspect of

considerable difference. Different aspects are shown in figs. 29, 30 and 31.

Antanossa appears to vary in the size and distinctness of its underside spotting in much the same way that *labradus* (*sangra*, etc.), does, but as I have seen fewer specimens, I cannot say that its range is quite as great.

I have a specimen of *dryina* (var. of *labradus*) from Sumatra, from the Moore collection (wherein it was ranged with *maha*), that I could not define from *antanossa* by spots.

Antanossa (fig. 32) agrees with *indica* in having the spot in the interspace 4-5 of upper wing, usually somewhat elongated obliquely, but this occurs sometimes in *labradus* and is wanting in some specimens of *indica*.

The genitalia point to *antanossa* being merely a geographical variety of *indica*. There is a difference, but hardly enough to carry much weight if the species were not clearly distinct otherwise, and occurred on the same ground.

The differences consist in the long basal hairs in *antanossa* being distinctly longer and not terminating in so finely produced a point, they are about twice the length of the clasp; in *indica* they are little more than half as long again. In both species there are towards the end of the clasp, about half a dozen long and strong hairs, whose extremities range very much with those of the basal hairs. In *antanossa* these hairs are on and close to the end of the clasp, those further back being smaller, whilst in *indica* the strong hairs are ranged along the margin of the clasp, those on the extremity being small.

The upperside colouring of the ♂, width of border, etc., appears to vary in much the same way in all three species, as it does, in fact, throughout the group.

ZIZULA.

I propose this as the generic name for *gaika*. *Gaika* is obviously not a true *Zizceria* generically; that it belongs to the same tribe may be supported by the presence of the remarkable hair on the clasps, that exists also in *Zizina* (*labradus* and *indica*). But it differs from true *Zizceriæ* in the neuration (vein II of forewing), in the form of the dorsal hooks of the appendages, and in the pattern of the marginal markings of the wings, these tending to fall into straight lines, instead of the sagittate character in

the other species of the group. (See fig. 8, compared with wing figures of other species.)

The appendages are shown in Figs. 33 and 35 (the latter more magnified). The hooks remind one of those of Plebeïds, but it may be noted that short, thick and curved as they are, they are without the definite angular end of Plebeïds.

The most notable structure, perhaps, as marking ZIZULA off from ZIZEERIA is the remarkable form of the *oedeagus*, which is very large, short and thick, with two immense terminal, slightly curved spines, very different from the single fine, straight spine of the other species.

In all the rest of the tribe (*Zizeeria*, *Zizina*), the *oedeagus* is large, flask-shaped, with a dilated base and a narrower neck, terminating on one side in a fine spine. This may be seen in several of the figures, where also may be noted the very long portion of the eversible membrane (*vesica* of Pierce), occupying the whole neck of the "flask" (in the position it assumes in nearly all my mounts), which is armed throughout its whole circumference by fine spicules, looking very like a scaled surface; well seen in several of the figures, especially perhaps, fig. 28.

In *Zizula gaika*, there appears to be no such armature of the eversible membrane, which in truth I have not definitely seen, but in one of the large terminal spines of the *oedeagus*, the upper one in both my figures, there is centrally a curious little triangular, flange-like process with one margin notched. As this occupies exactly the same place in all the specimens I have examined, I take it to be attached to the spine and not to a contained membrane. This spine is smooth, polished, and seems to taper to a point, the other looks very similar, but its lower margin is serrated, and it has the appearance of being articulated at its base; it may, perhaps, belong to the eversible membrane.

The clasps have much the aspect of those of *indica* if very shortened and reduced, and the upper hairs strengthened. It is further to be noticed that the great basal hairs have a companion, are much larger and stronger proportionally than in *Zizina* and are not simply clubbed by a spindle-shaped expansion at the end, but appear to be fluted or grooved for some distance, so that the end is broadest at the very end, and then divided by the grooves into several portions.

ANTIZERA.

Atrigemmata can hardly be included in *Zizeeria*, it belongs to a group which appears to include also *lucida*, *stellata* and *panagaea*. This group has the neuriation of ordinary *Lycaenids* (*Plebeius*, etc.). The dorsal armature of the appendages has less long and slender hooks, and the clasps are of a pattern quite different from either branch of the *Zizeerias*. I suggest as a generic name for the group *Actizera*, in reference to its resemblance to *Zizeeria*, and to the white ray so obvious in *lucida* and indicated in *atrigemmata* and others. A white streak found also, of course, in *Plebeiid* and other *Lycaenas*, but of which *Zizeeria* has no trace. The underside markings of *erschoffi* suggests strongly an alliance with them, but the appendages show it to be a *Plebeiid*.

Atrigemmata (figs. 36 and 39) may be taken as the type of the genus, the clasps are without spines. The appendages of *lucida* (fig. 40) are curiously similar to those of *atrigemmata*, differing in little except the possession of spines on the convex margin of the clasp.

Fig. 7 shows the underside of *lucida*, and fig. 11 the neuriation.

The appendages of *stellata* (fig. 38) are much larger and bolder, especially the dorsal half of the ring (or girdle) is very broad and heavy, but the dorsal hooks and form of the clasp, leave no doubt that it belongs to the *atrigemmata* group.

As to *panagaea* (fig. 37), there may be some doubt as to its claim to being in the same genus with *atrigemmata*, but it is certainly somewhere very near. The neuriation is the same and the appendages are to the same pattern.

The clasps notwithstanding their large size and great breadth are really very similar to those of *lucida*, the dorsal hooks are more *Zizeeriid* than those of the other species of the genus. The peculiar short, broad *ocedeagus* is characteristic of the genus.

I have examined several other Palaeartic species that had some appearance of alliance with *panagaea*, and find on examining the appendages that some are so, but not at all closely. *Anisophthalma* and *cytis* are the nearest; *astruea* remotely, if at all. *Korlana*, though also an *Everid* and closely related to *proscusa*, appears to be quite distinct, the facies of the underside is even more *Zizeeriid* than

that of *prosecusa*. Apart from the appendages the two species differ in the position of the second spot from the costa, precisely as *karsandra* and *indica* do.

Subcoeruleus, Holland, Nov. Zool., vol. vii, p. 69 (1900), I have not seen, but from the very careful description, I have very little doubt that it is a form of the very polymorphic *Z. labradus*.

Delospila, Waterhouse, Proc. L. Soc. N.S.W., 1903, p. 211, Plate II, seems not to be a ZIZEERIA.

Lulu belongs to some distinct section of Lycaenids according to the evidence of the appendages.

Messapus and *mahallokoacna* belong to some group far from *Zizeeria*, the latter shows a beginning of the extraordinarily elaborate development of the dorsal armature found in *barberae*, the appendages are also very suggestive of alliance with *Custalius* and *Neopithecops*.

ZIZEERIIDI.

ZIZEERIA.

karsandra.*lysimon*.*maha*.*ossa*.

ZIZINA.

labradus (with vars., *otis* (= *sangra*) and *dryina*).*indica*.*antanossa*.

ZIZULA.

gaika.

ACTIZERA.

atrigemnata.*lucida*.*stellata*.*panagaea*.

etc.

EXPLANATION OF PLATES

- PLATE LI. FIG. 1. *Z. lysimon*, underside.
 2. *Z. maha*, underside.
 3. *Z. ossa*, underside, compare greater curvature of row of spots in forewing, and that in fig. 2

on the hindwing, spots 3, 4, 5 (from costa) are in line; in fig. 3 the three spots in line are 4, 5, and 6. The additional spot below spot in cell is a not rare aberration in *Zizeeria*. See also fig. 4.

4. *Karsandra*, in typical *lysimon* (European and African) the spots differ in size and boldness, as seen in fig. 1.

PLATE LII. FIG. 5. *Z. labradus* (var. *sangra*).

6. *Z. indica*, line of spots in forewing comparatively straight in 5, bent in 6. Note different direction of line joining spots 1 and 2 (from costa) in the two figures.
7. *A. lucida*, note coalescence of spots below vein 3 on forewing. These spots and sometimes the next are wanting in *atrigemmata*. Comparing also *stellata* and *panagaea*, one notes much plasticity in the development of the spots.
8. *Z. gaika*, note continuity of inner marginal line, and a spot above vein 10 in forewing.

PLATE LIII, showing neurulation of—

- FIG. 9. *Z. ossa*.
10. *C. absus* (*minimus*).
11. *A. lucida*.
12. *Z. gaika*.

PLATE LIV. FIG. 13. *Z. lysimon*, var. *knysna*.

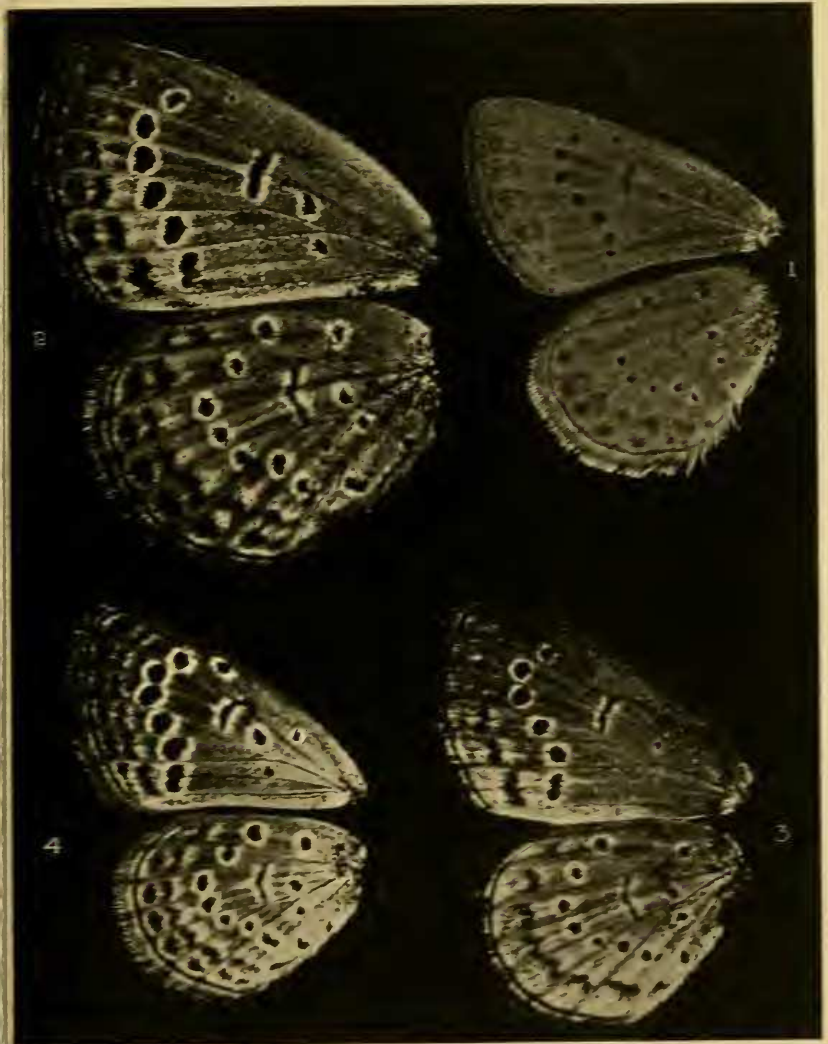
14. *Z. karsandra* (to show neurulation).
15. *Z. indica* (to show neurulation).
16. *Z. maha* (to show neurulation).

The remaining figures all show ♂ appendages, all magnified $\times 35$, except fig. 35, which is $\times 45$.

PLATE LV. FIG. 17. *Z. maha* from a specimen of the Godman collection (now at B. M.), labelled *argia*.

18. *Z. maha*, lateral view.
19. *Z. ossa*, lateral view (Poonah).
20. *Z. karsandra*, lateral view.

These four figures show well the long slender dorsal hooks, the projection on the ring or girdle, below the dorsal processes and separated from them by a narrow neck, the fine sharp spine terminating the *oedeagus* and the spines lining the eversible membrane. Note also, in fig. 19, *ossa*, the sharp spine on the ring just opposite the projection, not apparently present in any other species of the group.



Photo, A. E. Tenge.

ZIZEERIA: 2. maha.
4. karsandra.

1. lysimon.
3. ossa.